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Machines for Continuous Dyeing of Webs Under Pressure

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Feb. 19, 1957

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2,781,655

MACHINES FOR CONTINUOUS DYEING OF WEBS UNDER PRESSURE

Filed Oct. 7, 1954

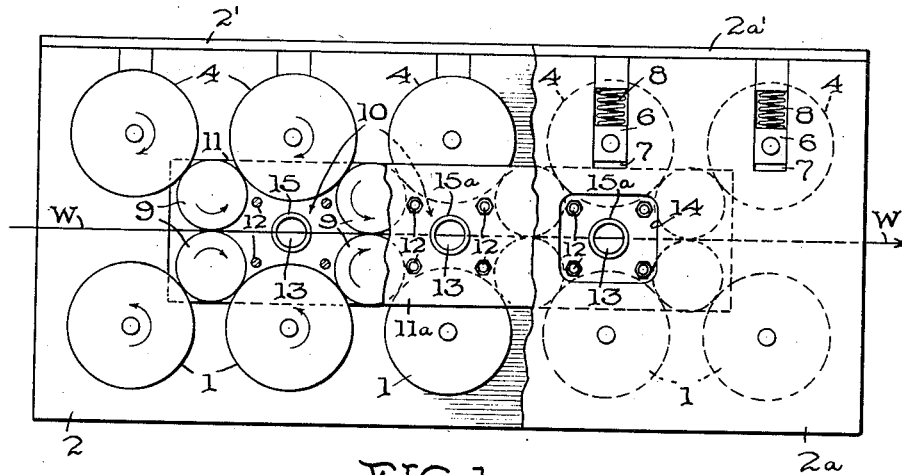


FIG. 1.

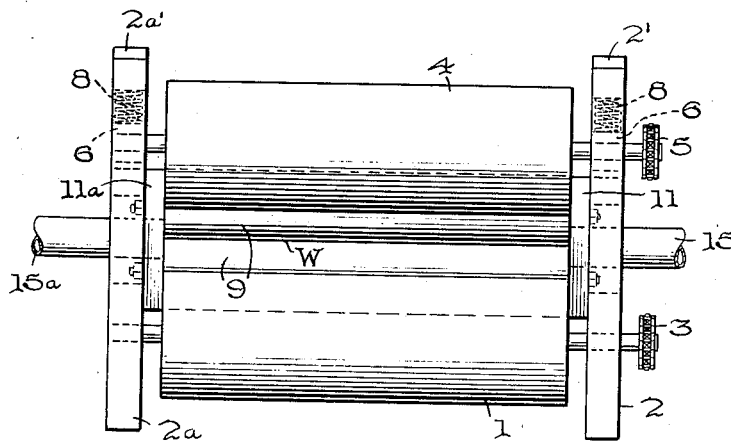


FIG. 2.

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2,781,655

MACHINES FOR CONTINUOUS DYEING OF WEBS UNDER PRESSURE

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Application October 7, 1954, Serial No. 460,832

6 Claims. (Cl. 68—22)

This invention relates to apparatus for the continuous pressure dyeing of fabrics and in particular to apparatus wherein the cloth or fabric in web form is passed continuously through a chamber or a series of chambers containing high temperature, high pressure dye liquor.

A primary object of the invention is to provide apparatus capable of continuously dyeing full width cloth at high pressure.

Another object is to provide apparatus which requires only a small volume of dye for operation.

A further object is to provide apparatus in which the cloth may be run through several processing stages or dyeing chambers without being exposed to the air or cooled between stages.

Still another object is to devise a novel fluid-tight gate structure for feeding a web into and out of a sealed dyeing chamber.

The objects of my invention are accomplished in a multi-chamber machine in which each chamber is defined by six rolls arranged in rolling contact with each other in a ring formation, and a pair of end plates which engage the ends of the six rolls to form a sealed space inside of the ring formation. An inlet opening for the dye liquor is provided in one end plate and an outlet opening in the other end plate. Two of the rolls at opposite points in the ring formation are journaled and are driven from a suitable source of power, while the remaining two pairs of rolls are free or un-journaled and constitute inlet and outlet gates for the chamber. One pair of feed rolls is common to two adjacent chambers and serves as the outlet gate for one chamber and the inlet gate for the other.

One form of the invention is shown in the accompanying drawing in which:

Figure 1 is a side elevational view of the apparatus with certain portions removed for the sake of clarity; and

Figure 2 is an end elevational view of the apparatus as seen from the right of Figure 1.

Referring to the drawing, a series of horizontally spaced drive rolls 1 are journaled at their ends in two spaced side plates 2 and 2a and are simultaneously rotated in a clockwise direction by suitable means such as the chain-and-sprocket drive 3. Mounted directly above drive rolls 1 are an equal number of drive rolls 4 which are vertically spaced from rolls 1 and are driven in a counter-clockwise direction by suitable means such as the chain-and-sprocket drive 5. Thus, drive rolls 1 and 4 are arranged in horizontally spaced pairs, the rolls in each pair being spaced vertically. Drive rolls 4 are journaled in blocks 6 which are free to slide vertically in slots 7 formed in side plates 2 and are urged toward drive rolls 1 by springs 8 acting on blocks 6. Positioned between drive rolls 1 and drive rolls 4 are a series of feed rolls 9 arranged in pairs, one pair between adjacent pairs of drive rolls. These rolls are not journaled in side plates 2—2a but are free or floating, being held in position by drive rolls 1 and 4. Each feed roll 9 has rolling contact with

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the other feed roll of its pair and with a pair of adjacent drive rolls. Thus, each pair of vertically spaced drive rolls together with the two adjacent pairs of feed rolls are mounted in rolling contact with each other in a ring formation to provide a chamber 10 within the ring formation. The ends of chambers 10 are closed off by sealing plates 11 and 11a, which are held in place against the ends of the drive rolls and feed rolls by stay bolts 12. Each sealing plate is provided with a series of openings 13 which connect with the chambers 10 for the purpose of carrying the dye liquor to and from the chambers. Access holes 14 are provided in side plates 2 and 2a to allow adjustment of stay bolts 12 and for the necessary pipe connections 15 and 15a leading to openings 13. The sliding bearing blocks 6 are removable through the upper ends of slots 7 by removing the hold-down bars 2' and 2a' removably secured to the upper edges of side plates 2 and 2a. Thus, the upper drive rolls may be removed for the purpose of gaining access to the dyeing chambers.

The web of cloth W to be dyed is fed into the first set of feed rolls 9 from the left and passes through the succeeding sets of feed rolls, emerging at the right end of the apparatus. Thus, each pair of feed rolls acts as a gate for the dyeing chamber, and the pair of feed rolls between adjacent chambers serves as an outlet gate for one chamber and an inlet gate for the other chamber. Also, the web passes directly across each chamber from the inlet gate to the outlet gate without any intermediate support. By reducing the vertical spacing between the upper and lower drive rolls, the distance between the inlet gate and the outlet gate can be increased without increasing the volume of the chamber. Thus, the chamber can be arranged to provide a relatively long path of travel of the web in the chamber for a given amount of liquor enclosed in the chamber.

The dye liquor is supplied to the chambers 10 through pipes 15 connected with opening 13 at one end of the chamber and carried away from the chamber through pipes 15a connected with the opening 13 at the opposite end of the chamber. The dye liquor may be fed to all chambers simultaneously through the openings in one sealing plate 11 or it may be fed to the chambers connected in series, if desired. The configuration of the external piping 15 connecting the openings 13 will be determined by the manner in which it is desired to supply the liquor to the chambers.

The various rolls may be formed of or covered with yieldable resilient material of rubber-like characteristic, and the end plates also may be faced with rubbery material, if desired.

By using "free" gate rolls, the number of journaled rolls is reduced to a minimum, only two additional journaled rolls being required for each chamber added after the first. It will be apparent also that each of the upper drive rolls need not be journaled in sliding blocks, but alternate rolls in this set may be journaled in fixed bearings.

The dyeing machine may be cleaned easily by flushing the chambers with water supplied through the pipes 15 while advancing a cleaning cloth through the feed rolls.

I claim:

1. A dyeing machine comprising at least six rolls mounted in rolling contact with each other in a ring formation, and a pair of plates engaging the ends of said rolls to form a closed chamber inside of said ring formation, means for driving two of said rolls on opposite sides of said ring formation in opposite direction, a pair of rolls on one side of said ring comprising feed rolls and forming an inlet gate for introducing web material into said chamber and a pair of rolls on the opposite side of said ring formation from said inlet gate and forming an outlet gate for said web material, and connections for passing dyeing

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liquor through said chamber, said inlet and outlet gates supporting a section of said web material in said chamber free of support between said gates.

2. A dyeing machine according to claim 1 wherein said rolls are arranged in a double-ring formation between said plates having a common pair of feed rolls joining the two ring formations.

3. A dyeing machine according to claim 2 wherein said common pair of feed rolls are free of journalled supports and are held in position by surface contact with the adjacent rolls in the double-ring formation.

4. Apparatus for dyeing web material comprising a first set of drive rolls journalled in spaced parallel relation in a first common plane and simultaneously rotatable in one direction, a first set of feed rolls each having rolling engagement with a pair of said first drive rolls, a second set of drive rolls journalled in spaced parallel relation in a common plane parallel to said first common plane and simultaneously rotatable in the opposite direction to the rolls in said first set of drive rolls, a second set of feed

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rolls, each having rolling engagement with a pair of rolls in said second set of drive rolls and with a roll in said first set of feed rolls, two sealing plates engaging the opposite ends of the rolls in both sets of drive rolls and both sets of feed rolls, whereby closed chambers are formed between the spaced pairs of feed rolls, and means for supplying dye liquor to the chamber thus formed.

5. Apparatus according to claim 4 wherein certain of the rolls in one set of drive rolls are mounted for movement transversely of the common plane of the other set of drive rolls, and including means resiliently urging said movable drive rolls toward the said other set of drive rolls.

6. Apparatus according to claim 4 wherein said feed rolls are free of journalled supports and each feed roll is held in position by rolling contact with one other feed and two drive rolls.

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